IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF TEXAS
HOUSTON DIVISION

WESTERNGECO L.L.C.,	)
Plaintiff,	)
v.	) Civil Action No. 4:09-CV-01827
ION GEOPHYSICAL CORPORATION,	) Judge Keith P. Ellison
Defendants.	)

WESTERNGECO'S OPPOSITION TO ION'S MOTION
FOR A NEW TRIAL AND CROSS-MOTION FOR JUDGMENT

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INTRODUCTION

On May 7, 2014, after five years of litigation, a four-week jury trial, and lengthy post-trial motions, the Court entered judgment on ION's infringement and awarded WesternGeco $12,500,000 in reasonable royalty damages and $93,400,000 in lost profit damages. Despite its best efforts before this Court and at the Patent Office, ION could not escape judgment for its willful infringement of valid claims of at least two WesternGeco patents. The Supreme Court—confirming this Court's decision on the same issue—rejected ION's effort to avoid lost profits altogether, and the Federal Circuit recently rejected ION's last effort to avoid royalty damages.

But because some patent claims were cancelled in collateral proceedings, the Federal Circuit has remanded this case for this Court to answer a single question before judgment is re-entered on the jury's $93,400,000 lost profits award: whether "WesternGeco established at trial with undisputed evidence that '520 patent claim 23 covers technology necessary to perform the surveys upon which the lost profits award is based." The trial record unequivocally shows that the answer to that question is yes—WesternGeco made such a showing at trial.

Claim 23 covers laterally steering a marine seismic array in a "turn control mode." As construed by the Court, this includes "throwing out" the array's streamers to push them faster through the turn after ending a survey pass, followed by "driving each streamer" back into line so that the next pass can begin, and ensuring that the correct "feather angle" is achieved before the turn ends. With streamer arrays exceeding six miles long and a half-mile wide, claim 23 provided faster turning for line-changes that saved ION's customers an estimated $500 million each year. And claim 23's invention also enabled sharp turns around obstructions, deadhead runs, short run-in and feather matching that was necessary to perform the 4D (or "time lapse") surveys that were the bulk of the lost profit jobs behind the jury's verdict.

Although ION and its new counsel now claim otherwise, the turn control technology of

claim 23 was critical to ION's infringement and ION did not even dispute that there was consumer demand for claim 23's turn control mode at trial. Indeed, evidence at trial showed that improved turning control was actually the impetus for WesternGeco's lateral steering project. Once ION's customers saw WesternGeco's patented turn control technology, they required turn control and its related financial and technical benefits on their surveys—which led ION to launch DigiFIN expressly "to compete in the market space that WesternGeco has created." At no point did ION offer evidence at trial or even contend that any of the lost profit surveys could have been performed without WesternGeco's patented turn control, and the jury rejected ION's argument that any noninfringing substitutes existed. As set forth below, undisputed trial evidence confirms that claim 23 was necessary to perform the surveys underlying the jury's lost profits award and that ION's motion for a new trial should be denied.

After a decade of litigation, this case remains where the jury left it in 2012—with $93,400,000 owed in lost profits for ION's willful infringement. Because no additional issues remain, WesternGeco requests judgment be re-entered on that $93,400,000, along with $11,977,828 in interest as set forth below, to bring this long-running litigation to a close.

NATURE AND STAGE OF THE PROCEEDING

WesternGeco filed its Complaint on June 12, 2009, to halt ION's willful infringement. (D.I. 1). After a four-week trial in 2012, the jury found that ION willfully infringed WesternGeco's patents, awarding $93,400,000 in lost profit damages for ten surveys, as well as royalty damages on the remaining infringement. (D.I. 536 at 8) Neither the jury instructions nor the verdict form required the jury to identify a specific patent claim as the basis for its award. (Ex. B, Tr. 5106-5146; D.I., 536) Rather both parties and their experts offered unitary damages not affected by the particular claims infringed. (Ex. B, Tr. 2661:13-2662:6, 4655:12-4656:3)

The Court denied five ION motions for a new trial—including on damages—and entered

judgment on May 7, 2014 permanently enjoining ION from continued infringement and awarding the jury's damages as well as $11,089,687 in pre-judgment interest along with costs and supplemental royalty damages for post-trial infringement. (D.I. 687)

On appeal, the Federal Circuit reversed the denial of JMOL as to "lost profits resulting from lost contracts for services to be performed abroad," but otherwise "affirm[ed] in all respects." *WesternGeco L.L.C. v. ION Geophysical Corp.*, 791 F.3d 1340, 1349 & 1354 (Fed. Cir. 2015). On remand, the parties agreed that $1,306,646 of the pre-judgment interest remained for the reasonable royalty damages that were affirmed (*i.e.*, $9,783,041 of the prejudgment interest was due to the lost profit award). (D.I. 738 at 1-2; D.I. 769 at 2)

The Supreme Court vacated the Federal Circuit's decision, finding that this Court's "damages award for lost profits was a permissible domestic application" of U.S. patent law. *WesternGeco L.L.C. v. ION Geophysical Corp.,* 138 S.Ct. 2129, 2139 (2018) On remand to the Federal Circuit, ION did not dispute that it remained a willful infringer of multiple WesternGeco patents, but instead argued for the first time that a new lost profits trial was required because some infringed claims had been cancelled post-judgment in collateral proceedings. The Federal Circuit remanded to this Court given its familiarity with the case. Applying a "harmless error" approach, the Federal Circuit tasked this Court with deciding whether the jury's verdict should stand, *i.e.*, whether "WesternGeco established at trial with undisputed evidence that '520 patent claim 23 covers technology necessary to perform the surveys upon with the lost profits award is based." In the alternative, a new trial on lost profits damages would be required.

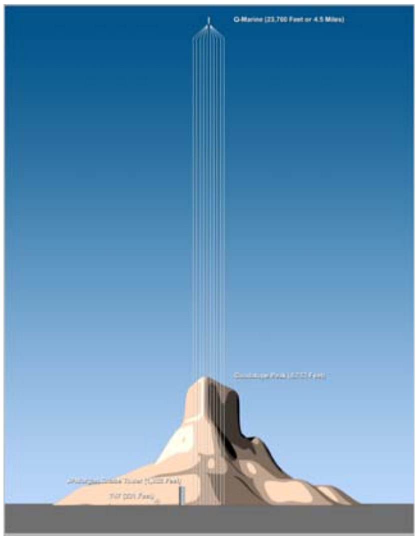
STATEMENT OF FACTS[1]

I. TURNING SEISMIC ARRAYS IS SLOW, EXPENSIVE AND RISKY

Marine seismic arrays comprise miles-long sensor cables spread out over many square

[1] Exhibit A summarizes the trial testimony and exhibits discussed herein.

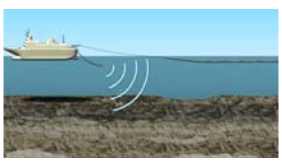
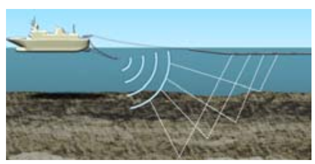
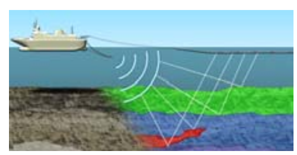
miles. They are the largest movable objects in the world—100 times larger than a 747 aircraft, over 20 times larger than the tallest building in Houston, and dwarfing the largest peak in Texas:



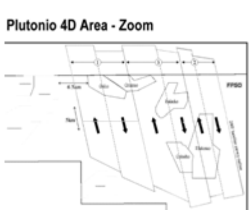
"So this is showing such a streamers being today behind the vessel, and these streamers are about four and a half miles long. In fact, you can have systems of streamers which go up to about six miles long. So this isn't the longest possible. And just to give you a sense of scale, down at the bottom there, you can hardly see it, is a Boeing 747, which is about 231 feet long. Then there's the JPMorgan Chase Tower, which is the biggest tower in Houston [as of 2012] which is next to it, a thousand feet high. And then this is Guadalupe Peak, which is the tallest peak in Texas, which is 8,700 feet. So you can see the system is very huge, and the task here is to try and control all of these cables at the same time."

- Dr. Simon Bittleston, inventor of WesternGeco's '520 patent and Vice President of Research for WesternGeco's parent, Schlumberger (Ex. B, Tr. 498:9-23)

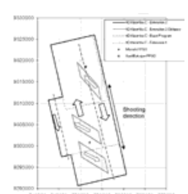
An airgun creates sound waves that reflect off subsea structures and are detected by this array, yielding an image of subsea oil and gas below the surface (similar to an ultrasound):

(Ex. B, Tr. 249:13-251:12, Scoulios Test.) While acquiring data, the streamer array is towed in a straight line to sweep over a swath of the area being investigated, and then turns around and passes back over the next swatch to acquire the next set of data—also known as a "line-change." The examples below from the trial record show six swaths being run in alternate directions (at left), as well as a more complicated set of six swaths being run at oblique angles (at right):



(Ex. C, PTX725 at WG0508687)



(Ex. D, PTX834 at WG00931741)

As Dr. Michael Triantafyllou, the Director of Ocean Engineering at MIT, explained to the jury:

> Between lines we have to turn, that's a very, very slow process. Why? If you turn too sharp, the streamer that is closest to the turn will lose tension, will lose slack and then all hell breaks loose. So you have to do it very, very, very slowly.

(Ex. B, Tr. 1325) Robin Walker, WesternGeco's Director of Marketing and VP of Sales testified similarly: "a seismic spread is the biggest moving thing on the earth, so it may be half a mile wide and four or five miles long, and you want to turn it around as quickly as possible." (Ex. B, Tr. 1615)) Mr. Scoulios, WesternGeco's President, testified from personal experience that:

> [y]ou are trying to control the cables constantly. They can get tangled. Every time you turned, it was a bit of an issue. You are just trying to manage these massive strings of spaghetti behind the boat. . . . So the best way to put it is this, if anybody has ever driven a trailer and you have had to turn left or right, one side of the trailer slows down and the other side speeds up a little bit. . . . But imagine if your trailer was 5 miles long. Now imagine that you had ten trailers that were 5 miles long behind you. Trying to navigate this thing becomes very, very difficult. . . . [V]ery quickly you start to create this horrible mess of spaghetti.

(Ex. B, Tr. 282-83) Not only did turns have to be wide and slow enough that streamers wouldn't tangle, the streamers needed to be towed a significant distance *after* the turn—three streamer lengths (an extra 18 miles out and 18 miles back). (Ex. E, PTX050) As Dr. Bittleston explained:

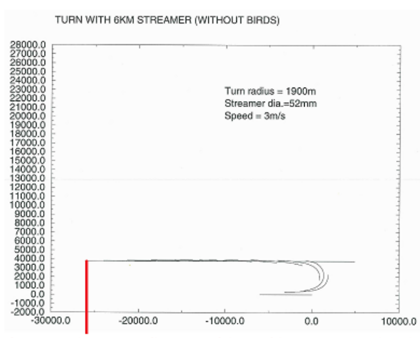
> [I]t takes without streamer steering, it takes quite a long time for cables to settle down behind the boat. You go for a certain distance from your previous data and you turn around. You come back a certain distance. And in that certain distance come back into position, and then they're ready for the next line of data. And normally before stream[er] steering that would be up to typically three streamer lengths. So to give you an idea about that, if we were to have a streamer heading from here today and 6-mile long streamer, which [] takes the tail would be down in Reliant Stadium or somewhere. We [would] pull it past at the rate that we do, which is about—it take about an hour to do one streamer length to get past us. So if you've got three streamer lengths going out in your data and turn and three streamer lengths coming back, that's six hours of time where you're not taking data. So it's wasted time.

(Ex. B, Tr. 531-32) This "run-in" was required before data acquisition. (Ex. B, Tr. 1615 ("those streamers have to be absolutely straight before you fire your first shot")) Before claim 23, "as much as a third of the duration of a survey, even before downtime, may be spent in non-

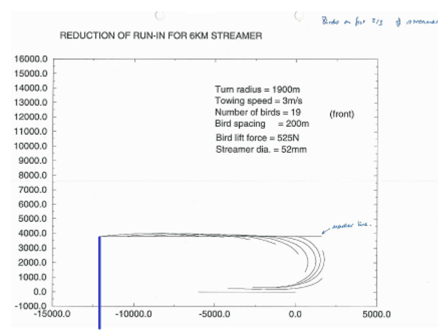
productive time during line changes." (Ex. F, PTX766) With each day costing hundreds of thousands of dollars, six hours wasted—for *each* turn—added up into many millions of dollars.

II. WESTERNGECO TARGETED TURN CONTROL TECHNOLOGY

In 1992-93, Dr. Bittleston moved to Norway and began work for WesternGeco's predecessor—Geco Prakla—on "Streamer Dynamics Calculations." (Ex. B, Tr. 520-21; Ex. G, PTX073) The first simulations Dr. Bittleston ran were "Pulling a streamer into line" and "Streamer through a turn." (Ex. G, PTX073) Such turn control was the impetus for lateral steering, and Dr. Bittleston's work showed that it could eliminate over half the required run-in:



(approx. 26km, or 16 miles, to straighten without turn control mode)



(approx. 12km, or 7.5 miles, to straighten with turn control mode)

(Ex. G, PTX073) As Dr. Bittleston explained to the jury:

> So this just shows you that you can pull a cable into line. By the time we get to the final position of the boat, it's pulled into line. And that's important, particularly for these patents because one of the patents has a claim of turning the spread around the corner, and getting it back on line. . . . And this is the calculation that shows me that I'm going to be able to push it on to line. So that's actually in one of the claims [*i.e.*, claim 23 of the '520 patent].

(Ex. B, Tr. 528) And Dr. Bittleston estimated significant benefits from his turn control technology—10-15% of the total survey value. (Tr. 561-62) With each survey costing tens or hundreds of millions of dollars, the value of faster turns quickly ran into the millions of dollars.

While Dr. Bittleston saw other applications of lateral steering—captured in other claims—there was concern about noise. *E.g.*, Ex. H, PTX056 ("excessive horizontal steering may increase flow noise significantly") Because seismic surveys rely on sound waves, noise

risked contaminating the data. As Dr. Triantafyllou explained: "When active steering happens . . . then they start producing noise. . . [s]o there are some limitations on how much you can do." (Ex. B, Tr. 1447-48) Others in the art similarly recognized that "[t]he use of streamer positioning devices comes at the price of introducing increased noise onto the seismic streamer." (Ex. I, ION266) Customers required that "[t]he noise levels from the active streamer steering system shall be assessed at the start of each survey and fin angle limits be established." (Ex. J, PTX485)

As Dr. Bittleston's lateral steering project continued, it accordingly retained its focus on the turning, *i.e.*, when noise was not a concern. For example, Dr. Bittleston's October 28, 1993 "Feasibility Report: Integrated Birds" emphasized that lateral steering can "reduce 'run-in time.'" (Ex. K, PTX085) The February 4, 1994 "Requirements, NESSIE-4 bird" report continued to emphasize the goal to "reduce 'run-in time.'" (Ex. H, PTX056) His February 17, 1995 invention disclosure on "Position Control of Marine Seismic Streamers" explained:

> Prior to shooting a line of data a certain cruising distance in a straight line is necessary to allow the streamers to settle into their path. This is typically three streamer lengths. A means of controlling horizontal positioning will allow this distance to be reduced and so again increase the cost-efficiency of the operation. . . . ***It is the purpose of this invention to . . . reduce run-in time***.

(Ex. E, PTX050). And the ensuing June 5, 1995 "Nessie 4 Development Plan" noted: "[M]ore value to the client. . . Faster turnaround time due to streamer steering." (Ex. L, FD0065) By August 28, 1997, this technology called "Turn mode" where "control is optimised to give a quick and safe turn." (Ex. M, ION138) As Dr. Bittleston's co-inventor Oyvind Hillesund explained—not only would the turn technology "help turn quickly without tangling [the] streamers," it would also "put these streamers right more quickly" and "move into the feather angle . . . more quickly." (Ex. B, Tr. 3524)

This was claim 23's "turn control mode," construed by the Court to include three components: (1) "generat[ing] a force in the opposite direction of a turn," *i.e.*, "throwing out the

streamers" to push through the turn faster; (2) "then directing each streamer positioning device to [its] position," *i.e.*, pulling the streamers back into line to reduce run-in; and (3) "defin[ing] a feather angle mode" coming out of the turn. (Ex. N, PTX001 at Cl. 23; Ex. B, Tr. 5117:13-17)

III. CLAIM 23 WAS A COMMERCIAL SUCCESS AND REQUIRED FOR 4D

WesternGeco launched claim 23's technology as part of "Q-Marine" in 2000. It was quickly touted for "efficiency gains through shortened line changes". (Ex. O, ION277) And as Mr. Scoulios testified, the faster turns alone were able to save an hour of time per turn "which, over the course of a survey, can be [] dramatic." (Ex. B, Tr. 397) By 2005, real world examples showed that turn timing had dropped from "as much as a third of the duration of a [seismic] survey" to under 2%—an immense savings. (Ex, F, PTX766; Ex. C, PTX725 at WG0508692)

The ability to target a specific feather coming out of a turn was crucial for "4-D," or "time-lapse" surveys. "Feather angle" was the angle between the streamers and the towing path:

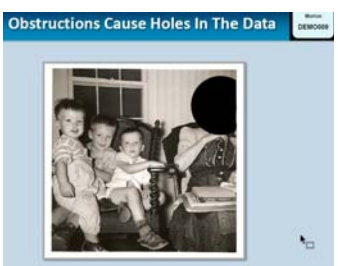
By repeating a survey over time—the fourth dimension in "4D"—oil companies could monitor a formation as oil was produced. As ION admitted, this was a unique sub-market for lateral steering. (Ex. B, Tr. 2276-77) But detecting subtle changes required repeating the survey as closely as possible, *e.g.*, by ensuring the same feather angle every time. (Ex. B, Tr. 844:5-845:4) For example, Fugro—ION's co-defendant and customer—charged $19 million of a survey *just for line changes* because those line changes required more time for "feather matching . . . and other requirements for 4D surveys." (Ex. P, PTX880) This was claim 23's technology—setting a "feather angle mode" coming out of line-change turns. (Ex. B, Tr. 5117:13-17)

Another challenge for 4D surveys were the oil platforms and other obstructions throughout the area to be surveyed. (*See*, *e.g.*, Ex. B, Tr. 1682 ("So with 4D, we talked about 4D, and how there's always—almost always a production platform")) As Glen Morton, a geophysicist and industry expert with 40 years of experience, explained to the jury:

"You have to keep the boat far enough away from the platform so that that far receiver doesn't smack into the platform. . . . And so there's this area that's got this kind of a data hole. ***And the problem with that data hole is that that's where your oil is because the platform is sitting right on top of the oil***, and that's what you're shooting the seismic for is to see what's under that. . . . ***Well, anything done around an oil field is going to have an obstruction. And so, predominantly, they hit the 4D market***."

(Ex. B, Tr. 2091:1-2092:11, Morton Test.)

Analogizing seismic surveys to photographs, Mr. Morten explain that obstructions led to holes in the data, often at the very point that was of greatest interest for the customer:



"This is back to my favorite photo of my great grandmother . . . And that's effectively what happens at an oil—around a platform with trying to shoot seismic. Right where you really want it, you really, really want to see, you don't get to see. And so, that's why it's really important to close that hole down as much as possible."

(Ex. B, Tr. 2092, Morton Test.)

Actively turning around these obstructions was necessary to acquire the desired data:

"Well this is a movie that basically shows what happens . . . The boat is dragging all those cables, and it's approaching the platform. ***And the boat turns, but by steering the cable, you'll see that circle—there's a little circle***. . . . That's usually the normal exclusion zone for a boat. They don't want a boat getting within half a kilometer of the platform. But now you're seeing the cables go within that distance. . . . ***And if we couldn't get really, really close to that platform, we weren't going to shoot, because the half-a-kilometer exclusion zone would keep us from actually seeing much of the field***. I mean we'd spend a lot of money and not get any results."

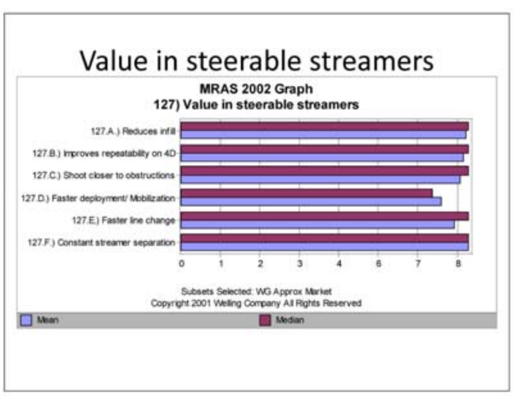
	(Ex. B, Tr. 2094-95, Morton Test.)

Although 4D had been attempted before Claim 23, these two aspects of Dr. Bittleston's turn technology—matching the prior survey's feather angle when beginning a swath and using sharp turns to survey close to platforms—were necessary to get the best results:

> Q. What role does lateral steering play in 4D surveys, in your opinion? A. Well, the biggest role is to be able to repeat exactly what you did last time, as well as to close that hole. . . . And if you've got this big hole where the oil field is—a big hole in the data where your oil field is, you can't use it very effectively.

(Ex. B, Tr. 2104-05) ION's documents echoed that "streamer feathering control [and] difficulty acquiring data around obstructions . . . hamper the accurate 4D imaging." (Ex. Q, PTX044)

Lateral steering "is required for the best quality 4D" (Ex. B, Tr. 2068-69) ION's customers testified "typically 4D surveys [] we see an absolute requirement" for Lateral Steering. (Ex. B, Tr. 1995:15-1996:2, Winspear; *see also* Ex. B, Tr. 2787:19-21, Stiver ("Q. Is the capability to steer streamers laterally a typical requirement for 4D surveys? A. Yes, it is.")) And the benefits of Dr. Bittleston's turn control technology of claim 23—*e.g.*, obstacle avoidance, sharper turns, shorter run-in and feather matching coming out of turns—were the specific aspects of "lateral steering" that customers needed. For example, industry surveys found that these benefits of claim 23—"Shoot closer to obstructions", "Improves repeatability on 4D" and "Faster line changes"—were three of the four greatest values for "steerable streamers":

<table>
<tr>
<td>
</td>
<td>"So Welling do market research for all companies in the oil field services. . . . And they will interview around 200 people, our customers . . . so we're not involved, which is you got much more accurate results . . . [S]o you see [here] how do [they] value . . . [and] this is the mean [and] the medians [] average responses."

(Ex. B, Tr. 1687-94, Walker Test.; see also Ex. B, Tr. 1840 (confirming data was from 2010 and that "MRAS 2002" was the name of the survey software, not the year))</td>
</tr>
</table>

When customers demanded "lateral steering," these turn control benefits of claim 23 of the '520 patent were the features they had in mind and the value that they desired.

IV. DIGIFIN COMPETED WITH WESTERNGECO'S TURN TECHNOLOGY

a) ION's Customer's Demanded a Turn Control Mode

After WesternGeco launched Q-Marine in 2000, ION's customers demanded a product to compete. Andre Olivier, ION's Director of Mechanical Engineering, testified that in 2000-01 ION was "approached from a customer [who] had a need to steer a streamer." (Ex. B, Tr. 3215:3-14) A 2001 "Steerable Streamers Concept Systems Discussion Document" emphasized the need for control "[b]etween lines" to minimize the "time spent between lines"; avoid "getting the streamers tangled up" and "ensuring that the streamers have straightened out . . . at the start of the next line," targeting a "turn finish mode"—*i.e.*, claim 23—for development by January 19, 2001. (Ex. R, ION130) In monitoring "Questions about Q," ION's very first question was "Are the Q birds used to shorten turn radius, and if so how much reduction is afforded by Q's lateral steering capability? How much time is saved on a typical job by virtue of faster turning? (Two or three papers have stated that Q allows 'significantly faster' turns, without providing hard numbers)." (Ex. S, ION338) A 2001-02 collaboration between ION and its customer PGS for a "Next Generation Streamer Positioning System" included a specific request on February 25, 2002 that "[t]he steering functionality should include . . . line change mode," *i.e.*, the technology of claim 23 (Ex. T, ION248)

This demand for lateral steering spread to the oil companies—as shown in a November 17, 2005 internal ION email:

> There is a very strong desire from many oil majors for competition to Q . . . At pretty much every oil company survey design or acquisition review meeting I have, I get asked about IO[N]'s steerable streamer strategy and schedule.

(Ex. U, ION304) And internal ION strategy documents focused on marketing lateral steering to

oil companies as a way to improve 4D surveys specifically:

> There are two aspects to the benefits of using steerable streamers utilising DigiFIN device: 1. Seismic Contractors…2. Oil companies…The latter is probably easier to promote, as oil companies in general appreciate that the key factor influencing the success of 4D studies is repeatability.

(Ex. V, PTX398) Claim 23's faster turning and 4D drove ION's decision to infringe.

b) ION Launched DigiFIN to Target WesternGeco's Market

In 2006, ION decided to launch its DigiFIN steering system in an effort to "break into" the Q-market for lateral steering that WesternGeco had created:

> Currently the only competitor in the cable steerage market is Western-Geco, with their proprietary "Q" system. . . . Today the oil companies have no alternative to their "Q" vessels. The DigiFIN opens the door to all 3D vessels, 62 as of today, ***to compete in the market space that Western-Geco has created***.

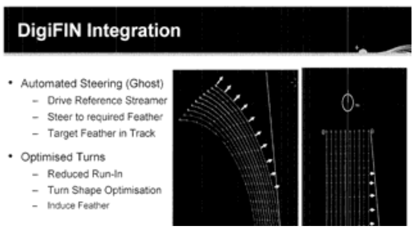
(Ex. W, PTX006 at ION016366) Customers were explicitly demanding this product due to the benefits of turn control: "I could have saved 25% on my last survey if I had DigiFIN." (Ex. U, ION 304, 2005 email discussing customer feedback from BP ("The areas he elaborated on were tighter line change turns . . .")) And ION's agreements with its customers mandated "Feather Matching . . . for 4D survey" and "Turn Optimization . . . with the optimal run[-]in length," *i.e.*, claim 23. (Ex. X, ION126) ION touted its turn control technology, as shown in an article by Jeff Cunkleman, ION's Director of Marketing, titled "Streamer Steering Now Crucial As Market Conditions Tighten":

> Streamer steering benefits
>
> **Steerable streamer technology enables seismic contractors to improve productivity by minimising time spent on offline operations. DigiFIN enables faster line changes by straightening cables coming out of a turn more quickly. In addition, the system can maneuver closer around obstacles near start of line, decreasing cycle time. Crews can deploy and retrieve multiple**

(Ex. Y, PTX045) Other ION articles, such as "Optimizing 4D Repeatability with Enhanced Acquisition Technologies" tied the turn control to improved 4D surveys and faster line changes:

> [S]treamer feathering control [and] difficulty acquiring data around obstructions . . . hamper the accurate 4D imaging of the subsurface . . . Lateral streamer control . . . allows for shorter line change time by reducing the run-in distance required for straightening the streamers at the start of line.

(Ex. Q, PTX044) ION's customers echoed their appreciation for "Line change efficiency" and that DigiFIN "Mitigates risk in obstructed areas." (Ex. Z, PTX394, "Fugro: Meeting the Challenges of Nature") ION's DigiFIN marketing materials touted "Optimised Turns":



(Ex. AA, ION129; Ex. BB, PTX230; *see also* Ex. CC, PTX048 (DigiFIN website touting "Reduced Line Change Time"); Ex. DD, PTX902 ("Improve[d] 4D repeatability" and "Better turns")) These presentations showed claim 23's technology, *i.e.*, forces throwing out the streamers at the beginning of the turn, followed by efforts to straighten the streamers and "induce feather" at the end of the turn. (Ex. B, Tr. 1327 (Dr. Triantafyllou testifying that DigiFIN "increases turn efficiency by steering streamers outward and straightening them more quickly for reduced run in time")) In discussing "Emerging Technologies and Techniques for Optimizing 3D and 4D Acquisitions," ION again highlighted "Optimised Turns: Reduced Run-In; Turn Shape Optimization; Induced Feather," *i.e.*, the turn control technology of claim 23. (Ex. DD, PTX902)

ION's technical documentation stressed these benefits as well: "The ION DigiFIN™ Lateral Control system . . . enable[s] faster spread stabilization after making a line change." (Ex. EE, PTX009 (System 3™ Lateral Controller User's Manual); *see also* Ex. FF, ION92 (ORCA Guide: Lateral Steering, showing how "Ghost mode on a turn" uses a "Turn Target Feather" to "help decrease the time taken to meet the required feather angle before the start of line.") And even ION's 10-K filings with the SEC made note that "[w]e believe that DigiFIN also enables

faster line changes." (Ex. GG, PTX071, Mar. 4, 2008 10-K) ION's customers "line change efficiency"—the faster turns of claim 23—mandatory, while other lateral steering remained optional. (*See, e.g.*, Ex. HH, PTX0360)

c) DigiFIN's Faster Turns Saved Customers up to $500 Million Per Year

ION calculated that every "10 minutes per line change" saved from "reduced line change time through active streamer 'straightening'" would yield "$6.4M per year in added value" per vessel. (Ex. II, PTX214; *see also* Ex. B, Tr. 2215-17 (testimony of J. Cunkelman)) ION quickly doubled its estimate to 20 minutes saved per turn, *i.e.*, $12.8 million per year:

> **Line changes**: The key factor in coming onto line is to have most of the cable essentially straight as the vessel reaches the first shotpoint. This constrains the length and tightness of the line change, especially with 'tear-drop' style line changes. DigiFIN should in principle allow the streamers to be turned onto line more rapidly, thereby reducing the line change time. Additionally, with ORCA, more efficient shooting patterns for a given configuration can be developed. For a survey with 100 sail-lines, a saving of 20 minutes per line change would deliver an overall saving on the survey of about 33 hours.

(Ex. V, PTX398; *see also* Ex. JJ, PTX386 (2008 letter from ION's customer noting that "we have improved [our] turn times by approximately 15-20 minutes per turn") A later ION case study showed 2 kilometers of run-in could be saved, *i.e.*, closer to 40 minutes or $25 million per vessel per year. (Ex. KK, PTX247) This was on par with the hour or more that WesternGeco was saving. (*See e.g.,* Ex. V, PTX398; Ex. JJ, PTX386) With 20 or more vessels equipped with DigiFIN by 2012, this equated to ***over $500 million per year from the turning time savings alone using claim 23***. And this is before any other benefits of claim 23—such as 4D surveys or obstacle avoidance—were even factored in. This was consistent with the expert testimony of Ray Sims, who calculated that these faster line changes alone represented between 10.8% to 13.1% of the entire survey value. (Ex. B, Tr. 2419-2422; *see also* Ex. B, Tr. 2494:8-13 (over $3 billion in DigiFIN surveys by 2012)).

V. OIL COMPANIES REQUIRED TURN CONTROL TECHNOLOGY

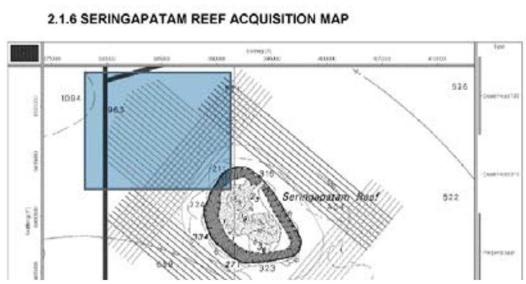
Oil companies demanded the turn control technology of claim 23, as evidenced in undisputed trial testimony as well as the formal bid requirements for seismic surveys. Statoil generally “encouraged [bidders] to offer lateral source and streamer control technology for all seismic work” but emphasized that “for 4D work . . . Company ***requires*** steerable streamers.” (Ex. LL, PTX473) This was true even for the initial 3D surveys, if 4D was possible in the future, and tied to the ability to come out of a turn with straightened streamers, *i.e.*, part of claim 23:

> **2.11 Streamer straightness on run-ins**
>
> Especially if data acquired in a seismic Survey is later to be repeated in a 4D context, it is of great importance that it is possible to repeat the sailing pattern. Thus the potential for a high degree of repeatability will be reduced if lines are acquired with cables coming out, or going into, a line turn. Hence, all run-ins (straight line segment) shall be *at least* a full cable length.

(Ex. MM, PTX594) The French oil company Total focused on 4D surveys around oil platforms, emphasizing that “[s]treamer steering devices are compulsory” and noting that “This program shall include acquisition of ‘dead head’ lines acquired toward obstructions.” (Ex. NN, PTX680; Ex. OO, PTX655) The lost-profit Petronas 4D survey likewise involved “Dead Head” runs with multiple oil platform obstructions. (Ex. PP, PTX650) ExxonMobil’s 4D project in Angola noted that approximately one-quarter of the survey lines were “deadheads” toward obstructions, and required only 1.5 streamer-lengths of run-in. ION’s customers confirmed that DigiFIN and the turn control technology of claim 23 were necessary to perform this survey:

> Q. Sir, the pass, you’re leading up to the pass, if you will on the ramp to the next run.
> A. Right. Yeah, and the whole intention with the run-in that’s why the company specified that we use run-in to keep time to get the steering straight.
> Q. And they want as little run-in as possible and so do you?
> A. They normally specify a fu[l]l streamer length of running. ***That’s not normally something that we can get away with***.
> ***Q. But this technology allows you to become straighter sooner in that run-in?***
> ***A. In theory, yes.***

(Ex. B, Tr. 1021-22, L. By Test.) ConocoPhillips also required "deadhead runs into the reef," set maximum times for line changes and required 1.5 streamer-lengths or less for run-in. (Ex. QQ, PTX742) As Mr. Walker explained, this required the "handbrake turn" technology of claim 23:



(PTX 742)

"So with 4D, we talked about 4D, and how there's always—almost always a production platform. Well, this is a different sort of obstruction, [] and it's very important to get close. And you can also see, if you look up in the top left-hand side [(highlighted in blue at left),] those lines going northwest/southeast. . . . ***those are what's called the deadhead*** . . . And this is—***in order to get in as close as possible, get as much data as possible and then to do a real hand-brake turn to avoid the reef***." (Ex. B, Tr. 1682, Walker Test.)

See also Ex. B, Tr. 1683 ("Q. Did the contractor or the oil company also tell you that you needed to use lateral steering to pull this off? A. They did.").

BP was skeptical about using lateral steering during data acquisition—"The noise levels from the active streamer steering system shall be assessed at the start of each survey and fin angle limits be established"—but still "specifie[d] steerable cables" and mandated that "Line run-in distance shall be one streamer length." (Ex. J, PTX485; *see also* Ex. QQ, PTX742 (limiting the steering allowed during a survey and noting "that all related noise specifications must be satisfied.")) For them as for others, the key value of lateral steering was the turn control technology of claim 23.

LEGAL STANDARD

A new trial must be denied "unless the evidence points so strongly and overwhelmingly in favor of the [moving] party that the Court believes that reasonable persons could not arrive at a contrary conclusion." Ex. RR, *Better Bags, Inc. v. Redi Bag USA, LLC*, No. H-09-3093, 2012 WL 13042513 at *3 (S.D. Tex. May 24, 2012) (Ellison, J.) (citing *Dawson v. Wal-Mart Stores, Inc.*, 978 F.2d 205, 208 (5th Cir. 1992). It is not appropriate to grant a new trial "unless it is

reasonably clear that prejudicial error has crept into the record or that substantial justice has not been done, and the burden of showing harmful error rests on the party seeking the new trial." Ex. SS, *J&J Sports Prods., Inc. v. Live Oak Cnty. Post No. 6119 Veterans of Foreign Wars,* No. C-08-270, 2009 WL 3049226, at * l (S.D. Tex. Sept. 17, 2009). As set forth in the Federal Rules:

> Unless justice requires otherwise, no error in admitting or excluding evidence—or any other error by the court or a party—is ground for granting a new trial, for setting aside a verdict, or for vacating, modifying, or otherwise disturbing a judgment or order. At every stage of the proceeding, the court must disregard all errors and defects that do not affect any party's substantial rights.

Fed. R. Civ. P. 61. Under the "harmless error" standard, a jury verdict should stand notwithstanding any errors in the charge where a correct instruction "would not have changed the result, given the evidence presented." *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1328 (Fed. Cir. 2002); *see also Avid Tech., Inc. v. Harmonic, Inc.*, 812 F.3d 1040, 1047 (Fed. Cir. 2016) (inquiring whether "the same verdict would necessarily be reached absent the error").

Given the unique procedural posture of this case, the Federal Circuit remanded, leaving ION a single, narrow basis on which to move for such a new trial: whether the turn control technology of claim 23 was required for the ten lost profit surveys. *WesternGeco L.L.C. v. ION Geophysical Corp.,* 913 F.3d 1067, 1075 (Fed. Cir. 2019). To prove lost profits, "absolute certainty is not required, for reconstruction of the 'but for' market is 'by definition a hypothetical enterprise' based on the evidence introduced at trial." *Fiskars, Inc. v. Hunt Mfg. Co.*, 279 F.3d 1378, 1383 (Fed. Cir. 2002). Rather, "a patent owner need only show a reasonable probability that it would have made additional profits 'but for' the infringement." *Id.* The trial record includes both testimony and exhibits. *See* Exhibit A. "Jurors are supposed to reach their conclusions on the basis of common sense, common understanding and fair beliefs, grounded on evidence consisting of direct statements by witnesses or proof of circumstances from which inferences can fairly be drawn." *Huffman v. Union Pac. R.R.*, 675 F.3d 412, 419 (5th Cir. 2012).

ARGUMENT

I. UNDISPUTED EVIDENCE ESTABLISHES THAT CLAIM 23 WAS NECESSARY TO PERFORM THE TEN LOST PROFIT SURVEYS

a) Customers Demanded WesternGeco's Patent

As the Court found, "ION conceded at trial that there was demand for the patented product." (D.I. 634 at 34) Demand also was evidenced throughout the record, as shown above.

b) Customers Benefited from WesternGeco's Turn Control Technology

Claim 23 of the '520 patent provides a suite of advantages for oil companies and contractors, as the undisputed trial evidence discussed shows. *See* Sections II-V, *supra*.

<u>Faster turns</u>. Claim 23 reduced both the time it took to turn as the run-in time required to straighten the streamers before data could be collected. This was the largest quantifiable benefit of lateral steering, saving ION's customers an estimated $500 million per year.

<u>Shorter run-in</u>. Claim 23 enabled shorter "run-in" distance to straighten out cables and get streamers into the desired feather angle positions. In addition to contributing to the "faster turning" addressed above, this also allowed for tighter maneuvering around obstructions and in crowded fields, which was crucial for 4D surveys around platforms and production equipment.

<u>Obstacle avoidance</u>. Claim 23 also enabled closer passes to in-sea obstructions, such as dead-head runs toward oil platforms followed by sharp turns around those obstructions, allowing more data to be collected. This was also crucial for 4D surveys, as oil platforms were usually located in the precise area of most interest to the customer.

<u>Feather angle</u>. Claim 23 included setting a feather angle coming out of a turn. This again was necessary for 4D surveys, where every shot tried to repeat the feather of a prior survey, and it helped reduce noise by performing the lateral steering *before* the survey recording began.

<u>4D</u>: Claim 23's package of benefits—faster turns, shorter run-in, obstacle avoidance and

feather matching—were necessary for most 4D surveys, which by definition occurred in obstructed fields that required close passes and repeating positions form prior surveys to get good data. No evidence from trial shows any alternative to claim 23 for achieving these benefits or performing the requirements of the lost profit surveys discussed below.

c) Claim 23 Was Necessary for at Least the Ten Lost Profit Surveys

Although over one hundred infringing DigiFIN surveys were presented at trial, WesternGeco sought lost profits for only ten.[2] Eight were 4D surveys, reliant on the sharp turns, obstacle avoidance, feather matching and shorter run-ins described above. The ninth "fully encompassed" a massive reef, and required "close-pass," "dead-head" runs with tight turns and short run-in to collect the necessary data. And the tenth required fast turns with short run-in that could only be performed with WesternGeco's turn control technology. ION did not object to the exhibits cited below, nor dispute the testimony and evidence discussed herein.

(i) Claim 23 Was Necessary for the Three Statoil Surveys

Three of the lost profit surveys embodied in the jury's award were 4D surveys for Statoil, whose bid documents stated that "for 4D work . . . require[d] steerable streamers." (Ex. LL, PTX473) Multiple witnesses confirmed this fact. (Ex. B, Tr. 2381-83 (Sims Test.)) As discussed above, the undisputed evidence at trial showed that WesternGeco's turn control technology—sharper turns around obstructions, shorter run-ins, and setting feather coming out of a turn—provided essential value for these 4D surveys. The tight acquisition window requested in these bid documents similarly tied the "steerable streamer" requirement to the specific benefits of turn control mode. (Ex. LL, PTX473 at FGRPROD000599959 (requesting a three-month window to complete the survey))

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[2] WesternGeco originally claimed lost profits for 25 surveys out of 207 total that used DigiFIN. When ION's co-defendant Fugro settled mid-trial, WesternGeco removed Fugro's surveys from its damages, leaving 10 surveys out of 101 total that were submitted to the jury.

(ii) Claim 23 Was Necessary for the Two Total Surveys

Two lost-profit surveys were 4D surveys for Total. The undisputed evidence at trial showed that Total required streamer steering for all 4D surveys. This was shown in the bid documents themselves—"[s]treamer steering devices are compulsory" (Ex. NN, PTX 680)—as well as the testimony of multiple witnesses. (*E.g.*, Ex. B, Tr. 2384-86) As with Statoil, the need for streamer steering was driven by the benefits of claim 23's turn control technology. Total's bid documents show drilling vessels, oil production platforms and a half-dozen "permanent installations" that required "'deadhead' lines 'acquired toward obstructions" and "close passes" in order to generate useful data. (Ex. NN, PTX680; Ex. PP, PTX650) The undisputed evidence confirms that turn control mode was the key to meeting these customer needs.

(iii) Claim 23 Was Necessary for the Two BP Surveys

Two lost profits surveys were for BP—one 4D and one 3D. (Ex. C, PTX725; Ex. J, PTX 485) The 4D survey involved obstructions such as "FPSOs" (floating production storage and offloading) platforms and drilling rigs. (Ex. C, PTX725) Similar evidence showed BP required streamer steering to address these 4D challenges. And the bid documents for the 3D survey required "Active Streamer Steering" and set run-in requirements (one streamer-length) that could only be met with WesternGeco's turn control technology. (Ex. B, Tr. 2386-87; Ex. J, PTX485)

(iv) Claim 23 Was Necessary for the Petronas Survey

The Petronas lost profits survey was "time lapse", *i.e.*, 4D. (Ex. PP, PTX650) It explicitly required "steerable" streamers. (*Id.*) And similar to the 4D surveys above, it involved acquiring data around five platform obstructions requiring deadhead lines to complete. (*Id.*) It was therefore also dependent on the tighter turns, obstacle avoidance, shorter run-in and ability to match feather coming out of a turn that WesternGeco's patented turn control technology enabled.

(v) Claim 23 Was Necessary for the ExxonMobil Survey

The ExxonMobil lost profit survey was also 4D. (Ex. D, PTX834) It comprised a "congested field" of platforms and other obstructions, requiring dozens of deadhead runs to acquire the necessary data. Similar to other 4D surveys, it limited run-in to 1.5 streamer-lengths, which the undisputed record showed were only achievable with claim 23. (*Id.*)

(vi) Claim 23 Was Necessary for the ConocoPhillips Survey

The ConocoPhillips lost profit survey "fully encompass[ed] [the] Seringapatam Reef." (Ex. QQ, PTX742). It explicitly required streamer steering and deadhead runs. (*Id.*) The bid documents require that "[f]or deadhead runs Contractor should account for the shape of the reef and the line turns necessary to operationally efficiently populate the coverage as completely as possible." (Ex. QQ, PTX742) As multiple witnesses testified, this type of deadhead survey toward obstructions required claim 23's turn control technology (Ex. B, Tr. 1682:18-1683:4, Walker test.; Ex. B, Tr. 2068:20-2069:7, Morton test.) It required passes and turns within a quarter streamer-length of the reef—something impossible without claim 23. (Ex. QQ, PTX 742 at WG00694417 ("approach distance to the reef . . . is desired to be 1.5 kilometers, if possible this should be reduced")) And the bid documents required turning times that were possible only using claim 23. *Compare* Ex. QQ, PTX742 at WG00694480-81 (requiring 3-4.25 hour turns for 10km streamers) *with* Ex. B, Tr. 531:6-532:9 (testifying that 6 mile, *i.e.*, 10km, streamers took 6 hours to turn without lateral steering))

d) No Acceptable Non-Infringing Alternatives Existed

No acceptable non-infringing alternatives existed for claim 23. Although ION raised two purported steering devices at trial—Nautilus and eBird—they were not available during the damages window and, in any event, not acceptable technology. As ION's witnesses testified:

Q. For a couple of years, if one of ION's customers wanted lateral steering, they

had to buy DigiFIN?
A. They could buy DigiFIN.
Q. There were no other lateral steering products available?
A. That is correct.

(Ex. B, Tr. 2209-10, Cunkelman Test.) No record evidence exists that the benefits of claim 23—*e.g.*, faster turns, short run-in, obstacle avoidance, close-pass deadhead runs, setting feather angle coming out of a turn—were achievable without infringing the '520 patent. The Court concluded that "WesternGeco presented evidence regarding the Nautilus and eBird, which the jury could reasonably conclude were not acceptable, non-infringing alternatives available during the relevant time period." (D.I. 634 at 34) ION tellingly failed to raise any prior art against claim 23 at trial—no turn control technology was known before WesternGeco. (Ex. B, Tr. 5295:13-20) As reflected in ION's Business Plan for DigiFIN, ION's motivation in launching DigiFIN was to be the first and only competitor of WesternGeco for this technology.

II. ION'S MOTION DOES NOT ADDRESS THE RECORD EVIDENCE

a) ION Mischaracterizes the Technology of Claim 23

ION repeatedly attempts to recast claim 23 as a mere time-saver unrelated to "the quality of the data gathered." Putting aside that this "time-savings" was estimated at $500 million per year, ION's premise is simply wrong. The undisputed record demonstrates many other benefits of claim 23—*e.g.*, sharper turns, obstacle avoidance, deadhead runs and feather matching—that were necessary to generate good 4D data. The ten lost profit surveys required claim 23.

b) ION Fails to Address the Record Evidence

ION repeatedly argues that "WesternGeco presented no testimony that the claim 23 technology was required." (*E.g.*, D.I. 785 at 17) That is simply wrong. Multiple WesternGeco witnesses testified about the need for claim 23's turn control technology. Not only did claim 23 provide a cost and time savings, it was necessary to achieve the desired data for 4D surveys and

others involving significant obstructions. Similar testimony was adduced during cross-examinations of ION and its customers, and through the documentary evidence discussed above.

ION faults WesternGeco for using the term "lateral steering" in opening statements and closing arguments. (D.I. 785 at 17-18) But there is nothing improper in using a short-hand phrase. The term "lateral steering" did not somehow *exclude* the turn control technology of claim 23. Rather the undisputed record evidence shows that this turn control was the impetus behind WesternGeco's "lateral steering" since 1992, delivered the largest quantifiable benefits of "lateral steering" and was necessary for the 4D and other surveys specified in the lost profit tenders. Similar short-hand used at trial and herein—such as faster turns, shorter run-in, obstacle avoidance, deadhead runs, and 4D—were all explicitly tied to claim 23 in the undisputed trial record. *See* Sections II-V, *supra*. WesternGeco's patented technology was required to achieve these benefits, and these benefits were necessary to perform the lost profit surveys.

c) No ION "Alternative" to Turn Control Existed

ION repeatedly asserts that some alleged alternative to WesternGeco's turn control technology exists, including repeated string cites to record pages with no parentheticals or explanation. (*E.g.*, D.I. 785 at 5, 16 (citing Ex. B, Tr. 295, 396-97, 561-62, 2113, 3917-19) A review of the pages ION cites belies ION's assertion.

While the cited pages acknowledge that seismic survey *vessels* turned before WesternGeco's invention, they show that the turning was slow, bulky, and ill-suited for use around obstructions. (*See*, *e.g.*, Ex. B, Tr. 295 ("And then you have added three to six hours for each of these line changes, so it might be a day or two later when you are coming back on the second line"); Ex. B, Tr. at 396-97 (the difference with the patented turning "could be quite dramatic, especially if you are going to a survey that's got obstacles"); Ex. B, Tr. 561-62 ("you can knock off a couple of hours on each turn"); Ex. B, Tr. 2113 ("The quicker line changes, that

was one of the more astounding things when I first used steerability. We had always taken an hour and a half to turn the boat, maybe two hours, and some of the [time] we going in 20 minutes. . . . I was just absolutely astounded.”)) Transcript pages 3917-19 merely comprise ION’s expert’s opinion that DigiFIN did not infringe claim 23—an opinion now proven false. And transcript pages 2092-94—cited in ION’s footnote 5—confirm that undershooting was *not* an acceptable alternative to close passes to obstructions because such undershooting was twice as expensive and even then still left holes in the data. Far from proving a non-infringing alternative, the pages that ION cites show that WesternGeco’s turn control technology was a dramatic improvement over the prior art.

ION also includes a lengthy footnote implying that some “noninfringing alternative” was conceded in collateral proceedings at the Patent Office. (D.I. 785 at 16 n.4) Not so. The IPR proceedings again concerned whether the prior art’s steering *of the towing vessel*—not the streamers—somehow rendered WesternGeco’s turn control technology obvious. (Ex. TT, POPR at 47-50) (“And nowhere does the ’153 PCT disclose the second phase of the ‘turn control mode,’ which directs the streamers ‘to go to the position defined by the feather angle control mode.’”) This is a far cry from any alleged admission that a commercially acceptable non-infringing alternative existed for claim 23, and in any event not part of the trial record in this case. The undisputed evidence from that record shows that no acceptable non-infringing alternatives existed, as the Court previously held and as ION never appealed. (D.I. 572 at 17-19)

III. JUDGMENT SHOULD BE ENTERED

For all of the reasons sets forth above, the undisputed evidence at trial demonstrates that WesternGeco’s turn control technology—embodied in claim 23 of the ’520 patent—was necessary to perform the ten lost profit surveys. When ION’s final motion for a new trial is consequently denied, no issues will remain.

Under Rule 58(b)(2), "the court must promptly approve the form of the judgment, which the clerk must promptly enter, when: (A) the jury returns a special verdict or a general verdict with answers to written questions; or (B) the court grants other relief not described in this subdivision (b)." Because ION's motion for a new trial fails, no issues remain and the Court should re-enter judgment based on the jury's verdict. That verdict established $93,400,000 in lost profit damages. The prior judgments and agreements between the parties establish that $9,783,041 is due in pretrial interest on those lost profit damages. And applying the same post-trial interest calculation that the parties previously agree on for the royalty damages—*compare* Ex. UU (calculating post-judgment interest) *with* D.I. 769-2 (showing payment of same)—yields an additional $2,194,787 in post-judgment interest. (Ex. VV[3]) No issues remain, and total lost profit damages (and interest thereon) comprise $105,377,828. WesternGeco respectfully moves for entry of that judgment

CONCLUSION

Twenty-five years ago, WesternGeco inventor Simon Bittleston began working on turn control technology. Twenty years ago, his patents were filed. Fifteen years ago, ION coveted that "proprietary" technology and saw that "oil companies have no alternative," and decided to launch the infringing DigiFIN system "to compete in the market space that Western-Geco has created." Ten years ago, WesternGeco filed this lawsuit to halt ION's willful infringement. The Court entered judgment five years ago. The undisputed trial record amply supports the jury's verdict. It is time to re-enter that final judgment, and at long last bring these proceedings to a close.

[3]As of May 1—an additional $1,450 is due each day thereafter until ION satisfies the judgement.

Dated: March 20, 2019

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the above and foregoing instrument has been forwarded to all counsel of record pursuant to Federal Rules of Civil Procedure on this the 20th day of March, 2019.

/s/ Timothy K. Gilman
Timothy K. Gilman